

ER3000 FAQs

Electropneumatic Controller/Motors

DEBUL2055X012

What is an ER3000 Series?

- An electropneumatic device
- A PID controller
- A low pressure, low flow, pressure reducing regulator

What is an electropneumatic device?

The user inputs an electronic signal, the device gives a pneumatic output.

What are PIDs?

P=proportional, I=integral, D=derivative PID is one of the oldest controls algorithm, which is commonly used in different industries.

What should you have in order to run an ER3000 Series?

- 24 VDC power supply
- A setpoint signal
- A feedback signal

Can you operate an ER3000 Series without a computer?

Yes. The computer MAY be used to send the setpoint signal (digital), but there are other options (analog signal or a profile already onboard the ER).

Can you tune the ER3000 Series without a computer?

No.

What is “tuning”?

Tuning is the selection of the proper values for your P, I, and D gains so that the system gives you the optimal performance characteristics that include speed, stability, and agility.

Do you have to tune the ER3000 Series periodically?

No. Once the ER3000 Series is tuned for a system in the setup phase, there is no need to re-tune the system, unless the system’s conditions and characteristics change so severely that the existing P, I, D values do not deliver the performance goals anymore.

How does ER3000 Series communicate with a computer?

RS485 communication.

What is an A/D and its resolution in the ER3000 Series?

An analog to digital converter and the resolution is 12 bits.

Can one use a digital transducer for feedback to the ER?

No, unless it is converted to an analog signal using a D/A.

What kind of analog signals can I send to the ER3000 Series?

4-20 mA or 1-5 VDC for both setpoint and/or feedback (ER3000XI-X) 0-10 VDC for both setpoint and feedback (ER3000XV-X).

What kind of overall accuracy can I expect from a system with ER3000 Series?

0.1% of the range of the transducer if the transducer has a 0.1% accuracy or better. Otherwise as accurate as the transducer.

What does an ER3000 Series do for my system?

- Control pressure (or flow, etc.) to the given setpoint
- The ER automatically compensates for the changes in the system
- No operator needed in the system once the setpoint is sent
- Easy downloadable profiles eliminate PC or PLC for cycling applications

Accuracy

- Closed loop control
- Every 25 m/sec the ER looks at the setpoint and feedback and goes through the PID loop
- User configurable PID parameters

Communications

- Use Labview, Visual Basic, C
- Use ER3000’s software package
- Data connection
- Monitoring using a PC

What does 1 “bit” in the system amount to (w.r.t. pressure or other control variable)?

1 bit is equal to 0.03% of the sensor’s range (the sensor that is used for feedback). You can never do better than 1 bit.

Do you lose your PID parameters on the ER when power is lost (or ER is unplugged)?

No.

Do you lose communication with the PC in case of a power loss?

Yes.

Do you lose your communication with the PC, if you are sending an analog setpoint to the ER?

No.

What happens to pressure when power is lost?

For the first 250 m/sec, the ER goes into the failsafe mode. After that since the solenoid valves in the ER are normally closed, the valves will close and the pressure is either trapped (in case the ER3000 Series is mounted into a dead headed system e.g. dome of a regulator) or the pressure would be lost if the ER is in flowing conditions.

What does “failsafe” mean in the ER3000 Series?

The computer may be used to configure the ER so that the system is driven into the failsafe mode if one or more of the following 5 parameters fall below or go beyond their minimum and maximum values. Notice that the user has the option of changing these minimum and maximum values, or disabling that parameter(s) so that regardless of its value the unit does not go into the failsafe mode. The 5 parameters are: analog setpoint, internal sensor, external sensor, inner error, and outer error. The failsafe mode can also be configured by the user to be one of the following 4 conditions: inlet closed/exhaust open, inlet closed/exhaust closed, inlet open/exhaust open, inlet open/exhaust closed. Once the ER is in the failsafe mode, the PID controller is disabled and the mode stays on until the parameter that caused the condition falls back into its “working” range.

What happens when you lose your analog setpoint source?

If a failsafe range has already been established, once the setpoint goes below its minimum, the ER will go into the failsafe mode (the valves will be open or closed depending on the user selection). If failsafe is disabled for the analog setpoint, then losing the setpoint will be translated into asking for 0 setpoint. The ER will open the exhaust valve, and the pressure is lost.

What happens if the feedback signal is lost?

If a failsafe range has already been established, once the feedback goes below its minimum, the ER will go into the failsafe mode (the valves will be open or closed depending on the user selection). If failsafe is disabled for the feedback, then losing the feedback will be translated into having 0 feedback. The ER will open the inlet valve to bring the feedback up to the setpoint value (if the setpoint is not zero) but obviously the feedback will not change. So the ER will stay full open.

What happens if the pneumatic signal is lost (0-120 psig into the ER)?

The pressure is eventually lost if either solenoid valve opens.

What happens if the communications with PC is lost?

- If the PC was sending a constant setpoint to the unit, the unit will continue on with the last setpoint it received and try to hold the feedback at that level (no major change).
- If the PC was sending a varying setpoint to the ER, the ER will take the very last setpoint (before communication is lost) and hold that as the setpoint.
- If the PC had already downloaded the profile into the ER and started the profile, the profile will continue without interruptions if communication is lost.

- If an analog setpoint was being sent to the ER, the ER3000 Series will not be affected by the loss in communications.

Can the user adjust the PID parameters on the board using pots or jumpers?

No.

What are the things I can do with the boards to setup the system?

Proper jumper position to select between current and voltage setpoint and feedback. You may also use the zero and span push buttons to calibrate the system, but this can be done more easily through the software.

How durable are the solenoid valves?

Clippard (the manufacturer of our valves) cycled them over 100,000,000 times. They stopped not because the valve failed, but because they got tired of running it.

What is the C_v of the solenoid valves?

0.01

Can I use the ER3000 for High Purity applications?

Yes, you will need to couple it with a high purity regulator/transducer.

Can I use it for hydraulic applications?

Yes, you will need to couple it with a hydraulic regulator/transducer.

What is the maximum flow and pressure that I can use the ER for?

As high of a flow and pressure that your mechanical regulator is capable of delivering. If the ER3000 Series is used as a standalone unit, it is a pressure reducing regulator with the following characteristics: $P_1(\text{max})=120$ psig / 8.2 bar, $P_2(\text{max})=100$ psig / 6.9 bar, $C_v=0.01$, media compatibility: dry clean air, N_2 , Argon, loading mechanism: analog or digital setpoint, closed loop system.

Can I use the ER with a back pressure regulator?

Yes. The transducer needs to be on the inlet side of the regulator in this case.

Can I use the ER3000 Series in vacuum service?

- If the ER3000 Series is used as a standalone, connect the vacuum pump to its exhaust port, put the absolute transducer on the outlet of the ER, and operate in the external feedback mode. The inlet may be open to atmosphere, or you may apply up to 120 psig / 8.2 bar, depending on availability of your supply and the flow needed in the system.
- If the ER3000 Series is used with a vacuum service regulator (Type 44-4600, 44-4700, 44-5000, FR, or DV) then the ER3000 Series will act as the pilot to the regulator.



WARNING! Do not attempt to select, install, use or maintain this product until you have read and fully understood the *TESCOM Safety, Installation and Operation Precautions*.